CLAIMS

1. A method comprising heating in the presence of a catalyst, a mixture comprising

(i) a reaction product obtained by mixing in the presence of a platinum group metal-containing catalyst at least one organohydrogensilicon compound containing at least one silicon-bonded hydrogen atom per molecule and at least one compound having at least one aliphatic unsaturation; where the organohydrogensilicon compound is described by formula (I)

$$\overline{(O\text{-}SiRX)_a(OSiR_2)_b}$$

where each R is independently selected from a hydrogen atom and a monovalent hydrocarbon group comprising 1 to 20 carbon atoms which is free from aliphatic unsaturation, a is an integer from 1 to 18, b is an integer from 1 to 19, a + b is an integer from 3 to 20, each X is an independently selected functional group selected from a halogen atom, an ether group, an alkoxy group, an alkoxyether group, an acyl group, or a silyl group, or a $-Z\text{-}R^4$ group, where each Z is independently selected from an oxygen and a divalent hydrocarbon group comprising 2 to 20 carbon atoms, each R^4 group is independently selected from $-BR_uY_{2-u}$, $-SiR_vY_{3-v}$, or a group described by formula (II):

$$(Y_{3-n}R_nSiO_{1/2})_c(Y_{2-o}R_oSiO_{2/2})_d(Y_{1-p}R_pSiO_{3/2})_e(SiO_{4/2})_f(CR_qY_{1-q})_g(CR_rY_{2-r})_h(O(CR_sY_{2-s}))_i(CR_tY_{3-t})_j$$

where B refers to boron, each R is as described above, the sum of c+d+e+f+g+h+i+j is at least 2, n is an integer from 0 to 3, o is an integer from 0 to 2, p is an integer from 0 to 1, q is an integer from 0 to 1, r is an integer from 0 to 2, s is an integer from 0 to 2, t is an integer from 0 to 3, u is an integer from 0 to 2, v is an integer from 0 to 3, each Y is an independently selected functional group selected from a halogen atom, an ether group, an alkoxy group, an alkoxyether group, an acyl group, or a silyl group, or a Z-G group, where Z is as described above, each G is a cyclosiloxane described by formula (III):

$(OSiR)(OSiRX)_k(OSiR_2)_m$

where R and X are as described above, k is an integer from 0 to 18, m is an integer from 0 to 18, k+m is an integer from 2 to 20, provided in formula (II) that one of the Y groups is replaced by the Z group bonding the R^4 group to the cyclosiloxane of formula (I), and provided further at least one X group of Formula (I) is a $-Z-R^4$ group;

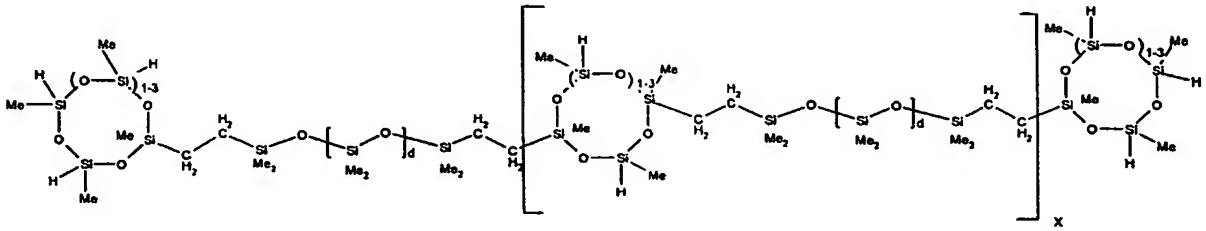
(ii) at least one endblocker described by formula (IV) $R'_3SiO(MeR'SiO)_zSiR'_3$, where z ranges from 0 to 150 and each R' is independently chosen from alkyl, aryl, alkenyl, dienyl or functional alkyls where the functionality may be fluoro, fluoroether , polyether, ether, aryl, silyl, siloxy, carboxy, glycosidyl or acrylate, and optionally

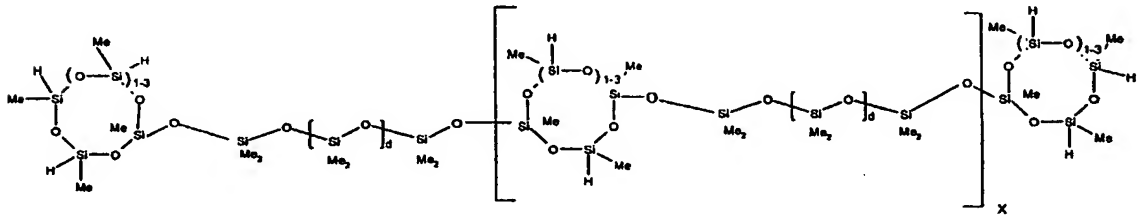
(iii) at least one organosiloxane chosen from a hydrolyzate described by formula (V) $HO(MeR'SiO)_{y'}H$ and a cyclosiloxane described by formula (VI) $(MeR'SiO)_y$ where y is an integer from 3 to 30, y' is an integer from 1 to 500, and each R' is as described above; so to cause polymerization of components (i), (ii), and optionally (iii) to form branched polymers.

2. The method of claim 1 where subscript b is an integer from 2 to 19, subscript c is an integer from 0 to 50, subscript d is an integer from 0 to 5000, subscript e is an integer from 0 to 48, subscript f is an integer from 0 to 24, subscript g is an integer from 0 to 50, subscript h is an integer from 0 to 50, subscript i is an integer from 0 to 50, and subscript j is an integer from 0 to 50.

3. The method of claim 1 or 2 where each R group is independently selected from hydrogen atoms, alkyl groups comprising 1 to 8 carbon atoms, or aryl groups comprising 6 to 9 carbon atoms, each X is a $Z-R^4$ group or is independently selected from chloro, methoxy, isopropoxy, where Z is a divalent hydrocarbon group, and R^4 is selected from $-CH_2CH_2-$, $-CH_2CH_2CH_2CH_2-$,$-O(CH_2CH_2O)_{z'}-$, where z' = 1-100, $O(CH_2\ CH_2CH_2O)_{z''}-$, where z"= 1-100 and siloxane groups described by $-R_2SiO(R_2SiO)_dSiR_2-Z-G$, $-R_2SiOSiR_3$, $-R_2SiOSiR_2-Y$, and $-RSi(OSiR_3)_2$, where d is an integer from 1 to 50 and Z, G, and R are as described above.

4. The method of any of claims 1 to 3 where the organohydrogensilicon compound is selected from the structures below where Me is methyl, $d^1 + d^2 = d$, and x can range from 1 to 100:





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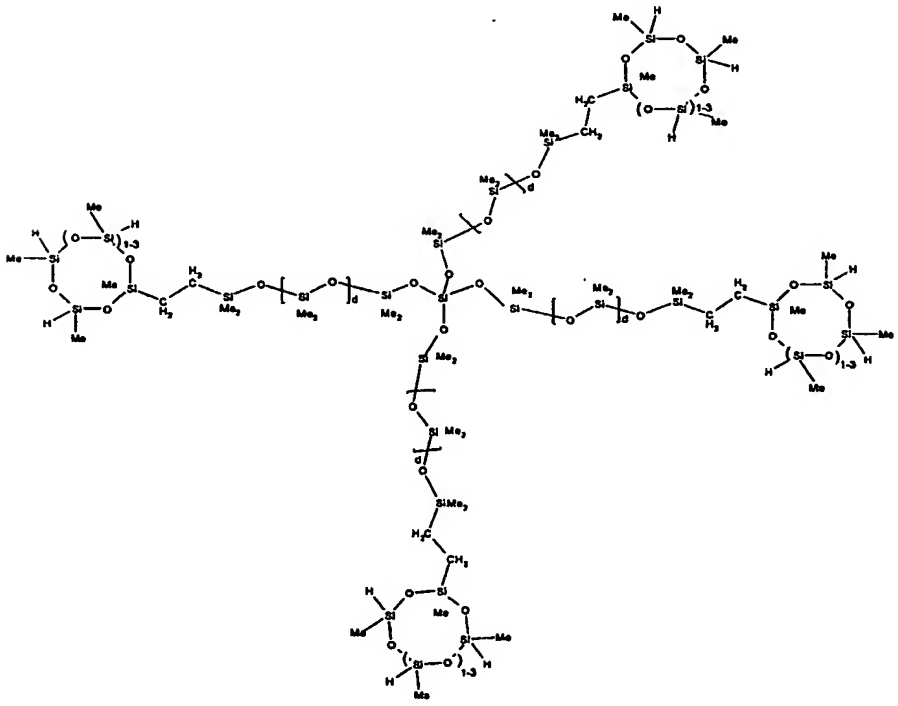
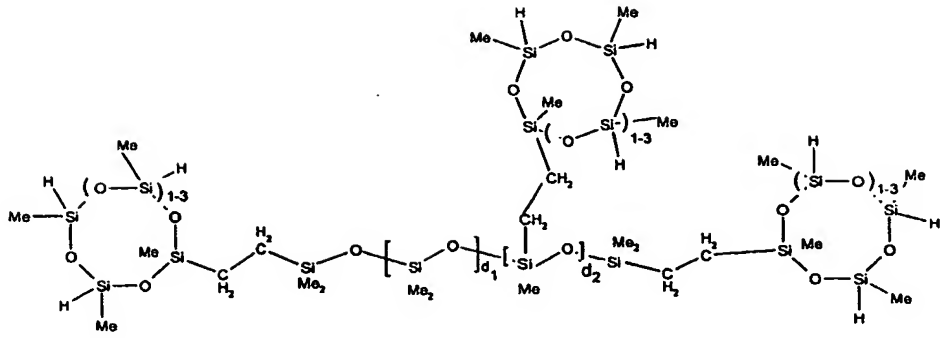
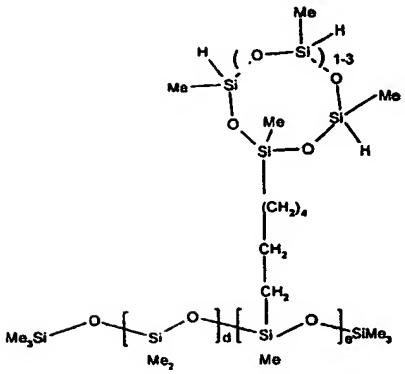
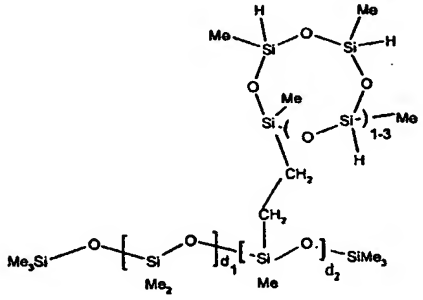
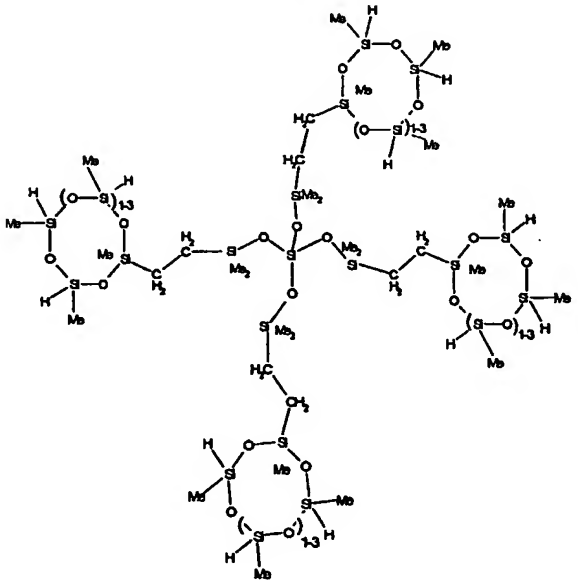
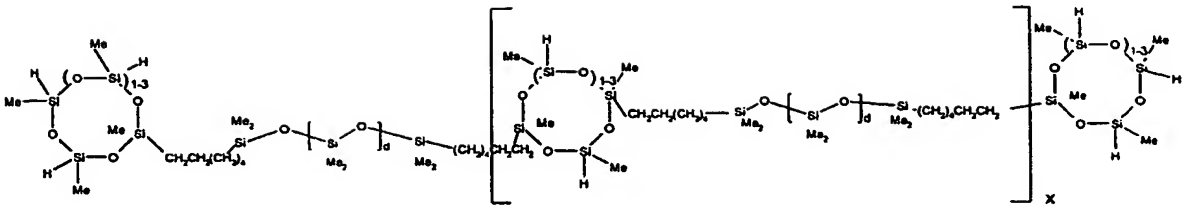


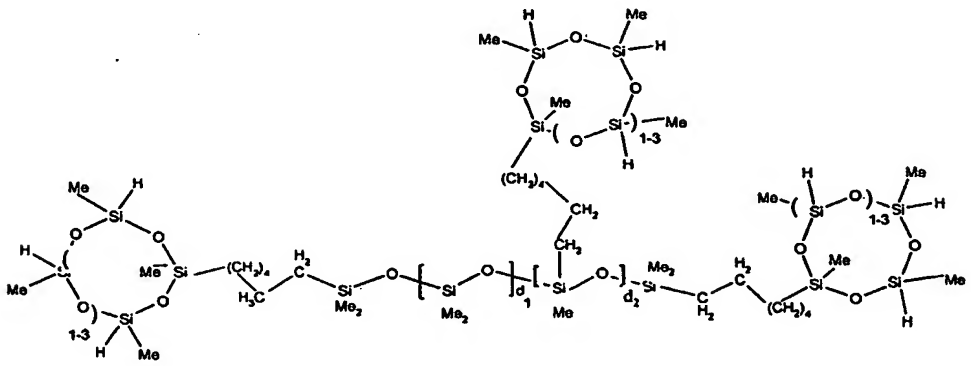


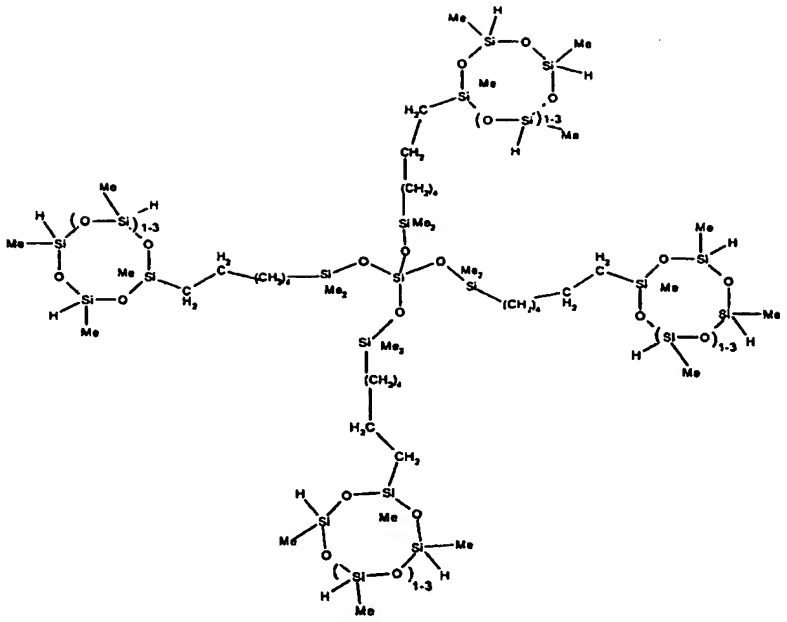




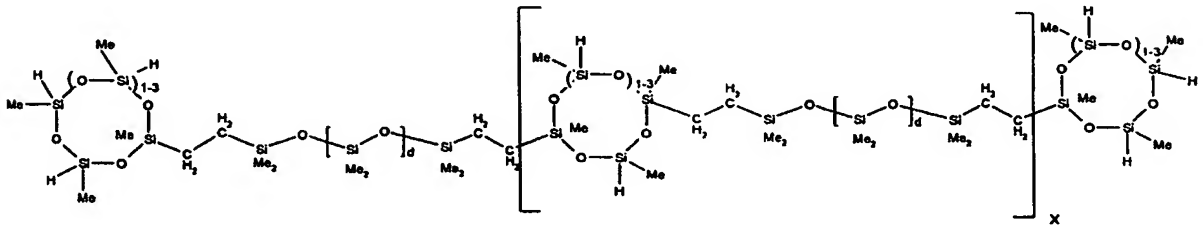








5. The method of any of claims 1 to 4 where the organohydrogensilicon compound is described by the structure below where Me is methyl, d is an average of 8, and x is an integer from 1 to 15.



6. The method of any of claims 1 to 5 where R' is independently chosen from alkyl, fluoroalkyl, or alkenyl, component (ii) is added in amounts from 3 to 1000 parts by weight based on 100 parts by weight of component (i), and component (iii) is added in amounts from 0 to 1000 parts by weight.

7. The method of any of claims 1 to 6 where R' is independently chosen from alkyl, fluoroalkyl, or alkenyl, component (ii) is added in amounts from 3 to 1000 parts by weight based on 100 parts by weight of component (i), and component (iii) is added in amounts from 0 to 1000 parts by weight.

8. The method of any of claims 1 to 7 where a sufficient ratio of aliphatic unsaturation to Si-H is used so that all the silicon-bonded hydrogen bonds on the organosilicon compound are reacted.

9. A branched polymer made by the method of any of claims 1 to 8.

10. A composition comprising a branched polymer made by the method of any of claims 1 to 8.

11. A composition comprising a branched polymer made by the method of claim 8, a Si-H crosslinker, a platinum-group containing catalyst, and an inhibitor.